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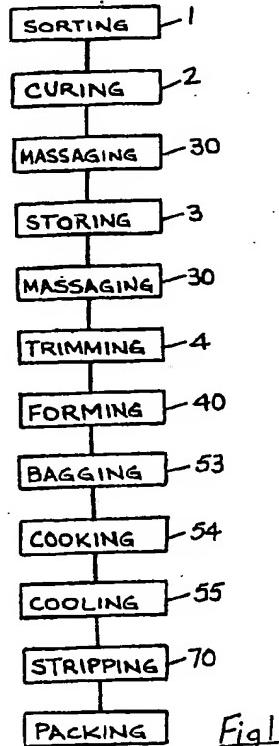
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## (54) "A ham production process"

(57) At a sorting station (1) raw meat pieces comprising silverside, topside and knuckle pieces are sorted into bins. The bins are delivered to a curing station (2) at which a brine solution is injected into each meat piece. The meat pieces are then massaged in a massaging drum (30) and subsequently removed and stored at 3 - 6°C in bins for 24 - 48 hours. The meat pieces are then massaged a second time prior to delivery to a trimming station (4) at which waste material is removed from the meat pieces. Downstream of the trimming station (4) the meat pieces are assembled into a composite ham at a forming station (40). Netting is drawn about the composite ham which is then inserted into a cooking bag from which air is evacuated prior to sealing the bag. The hams are then cooked (54). After cooking, the hams are cooled and then removed from the cooking bags at a stripping station (70) and then vacuum packed.



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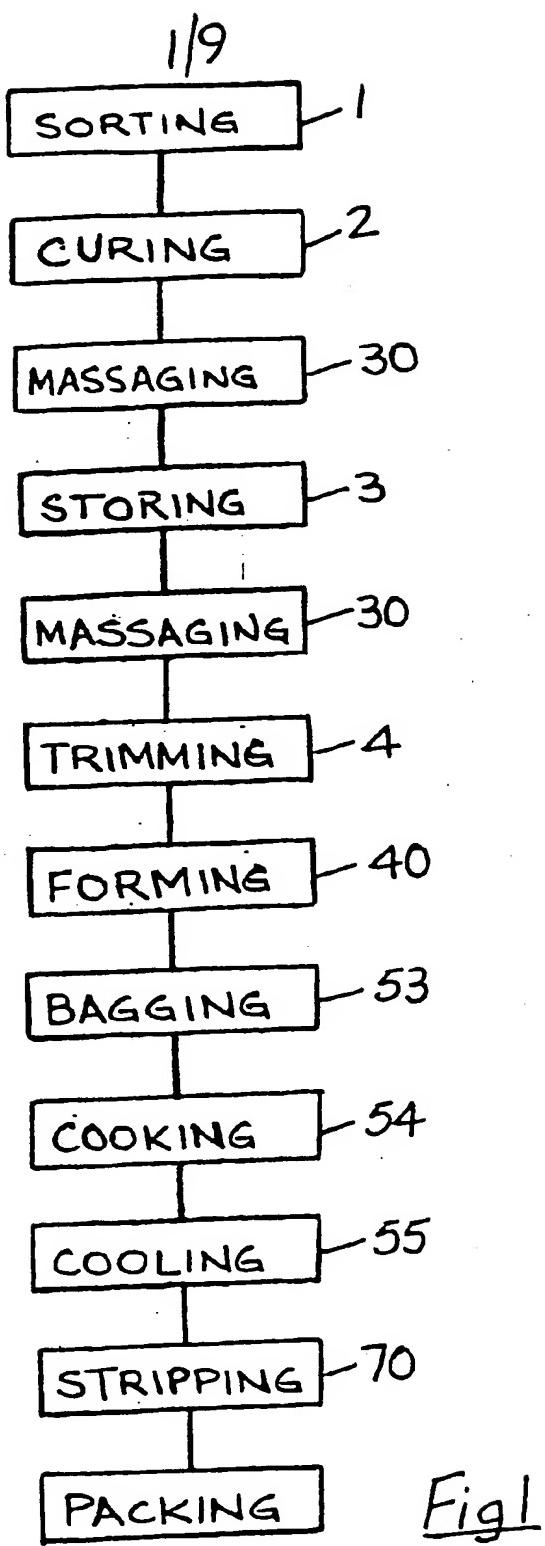
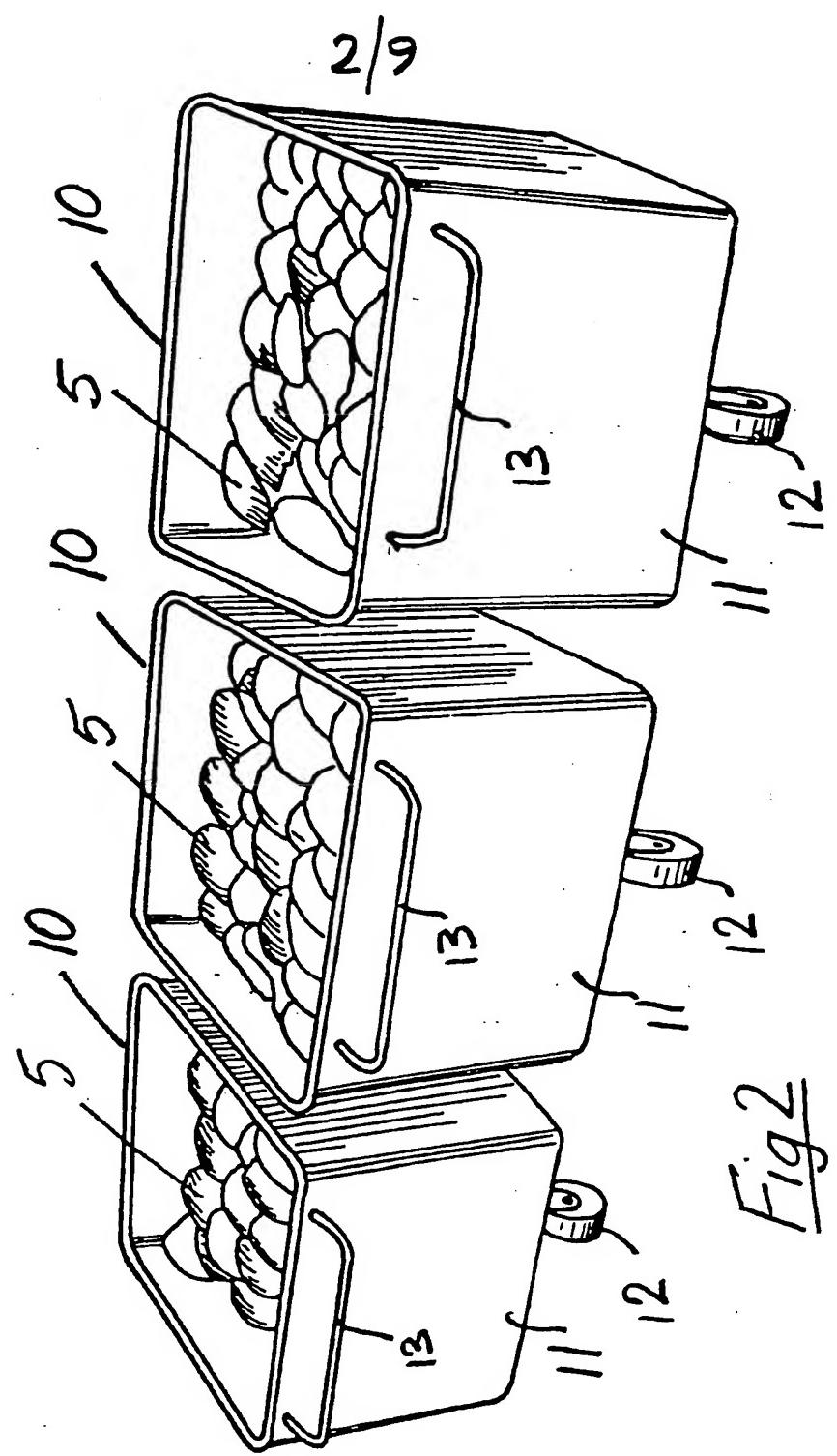


Fig1



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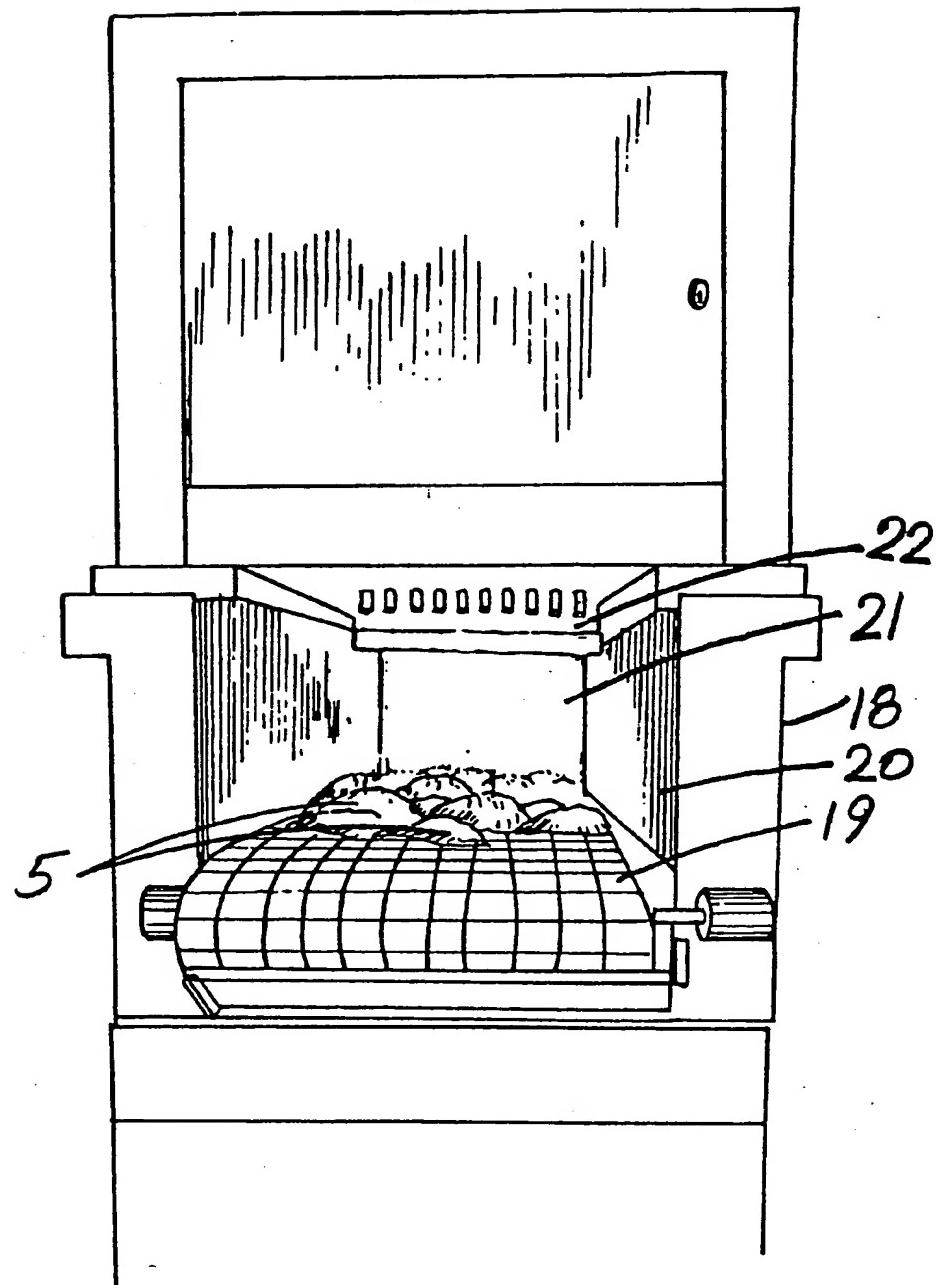


Fig 3.

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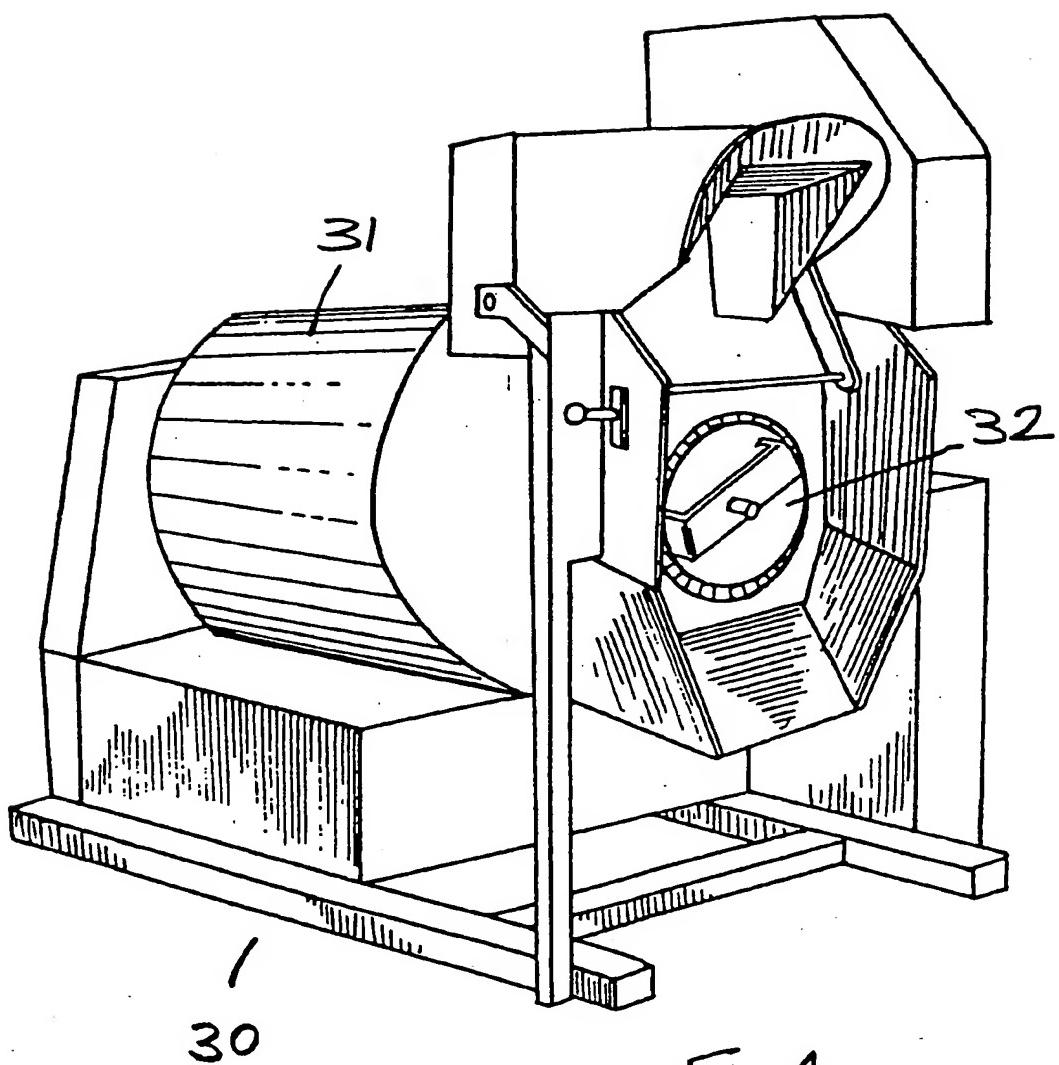


Fig 4

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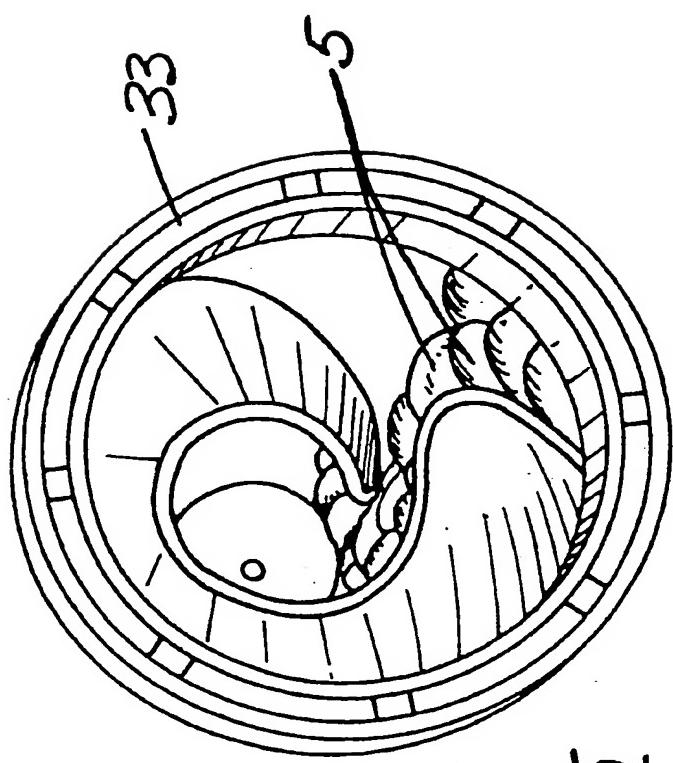


Fig. 5

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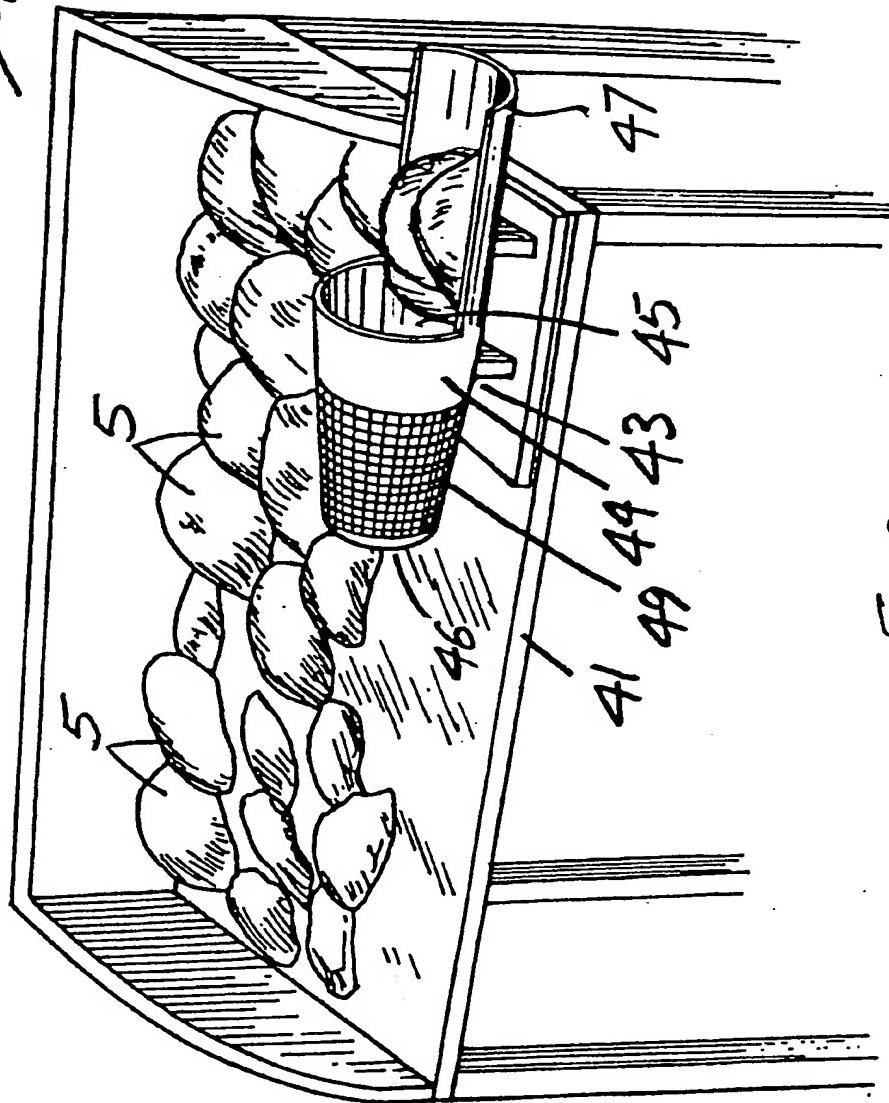
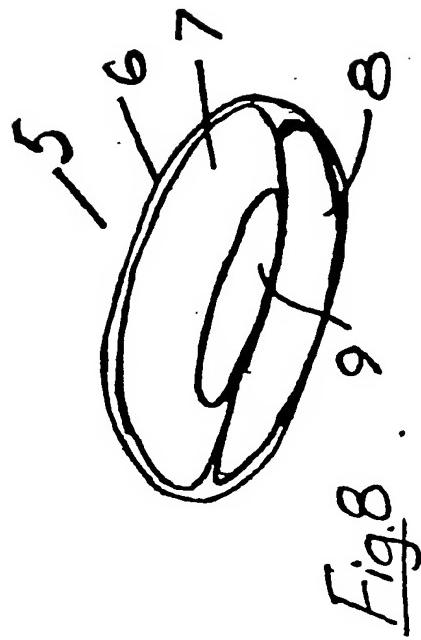
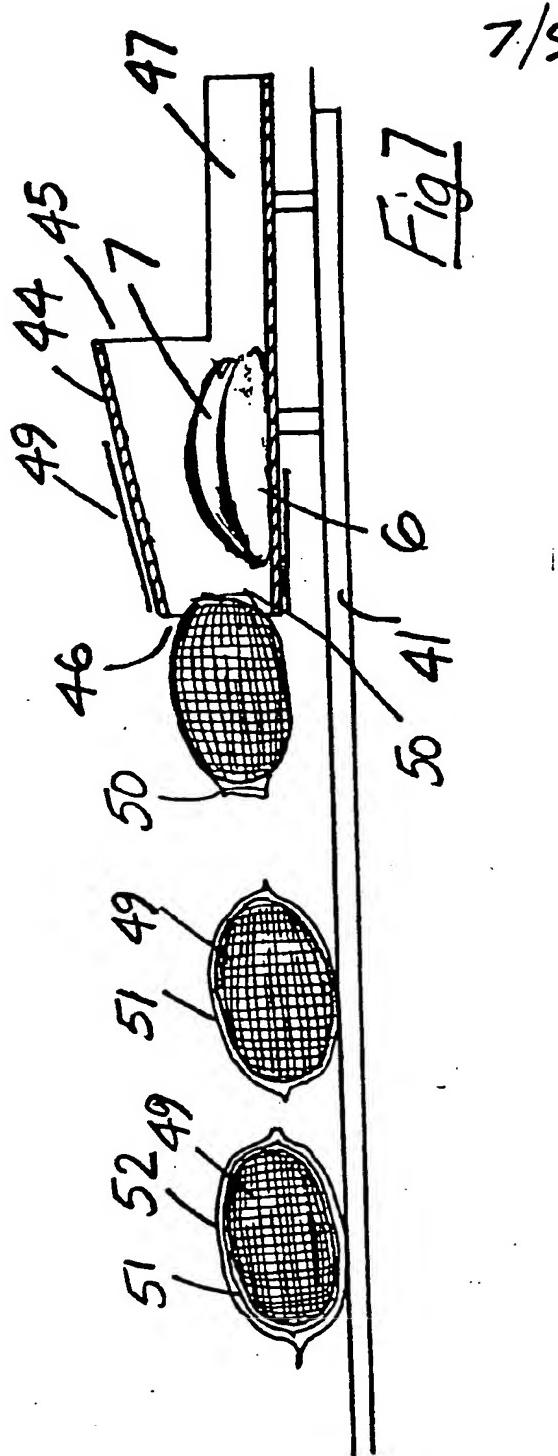


Fig 6



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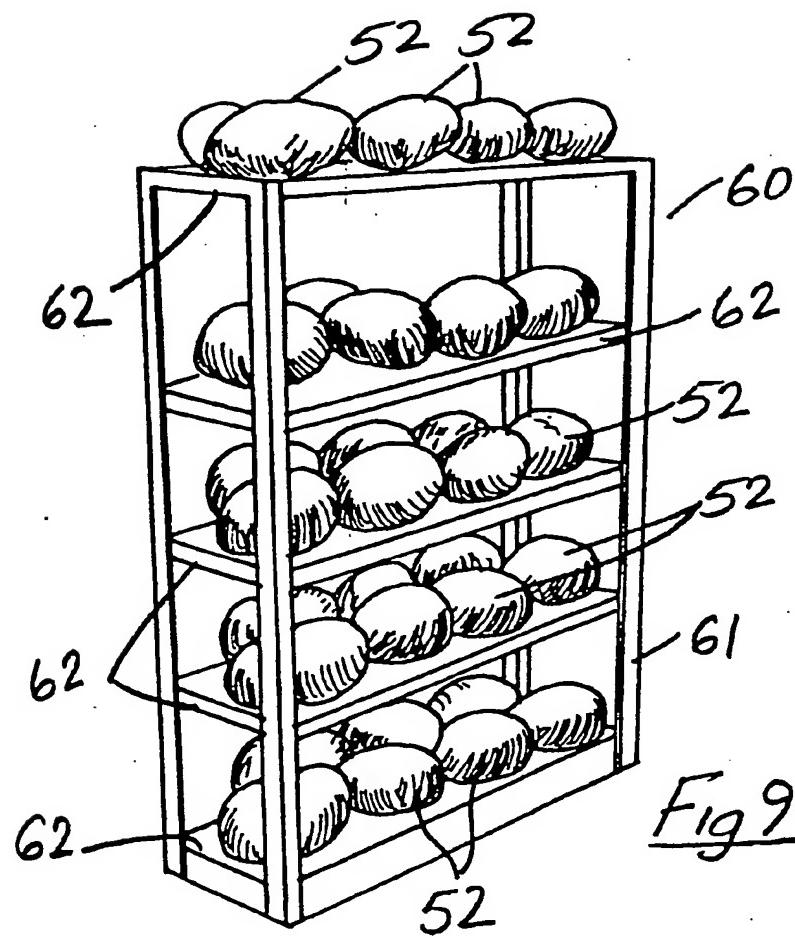


Fig 9

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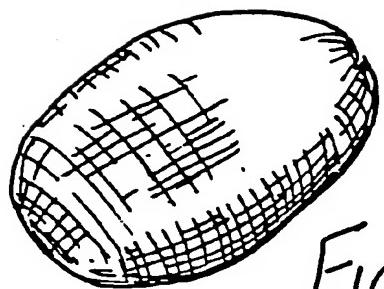


Fig 12

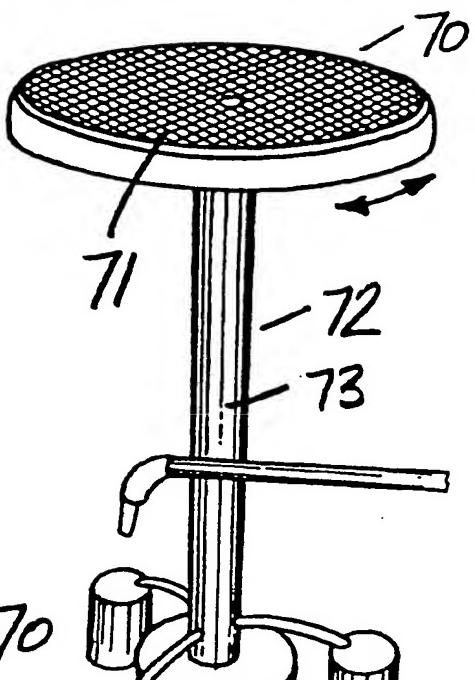


Fig 10

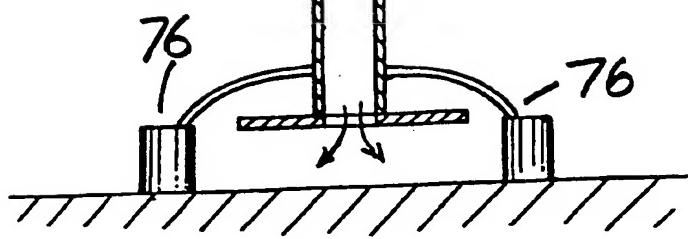
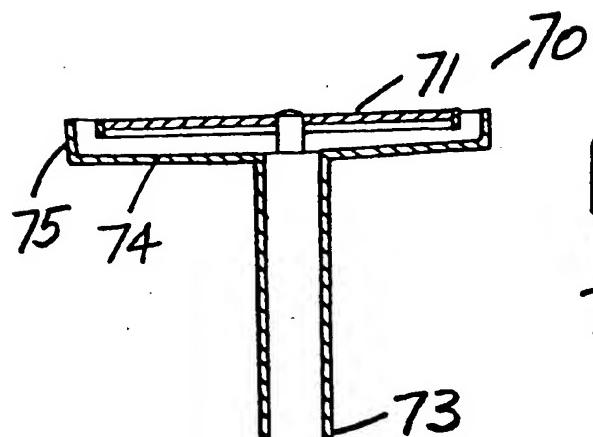


Fig 11

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**"A ham production process"**

This invention relates to a ham production process, in particular for producing a composite cooked ham.

It is an object of the invention to efficiently produce high quality composite cooked hams.

5 According to the invention there is provided a process for producing a cooked composite ham, comprising the steps:

delivering raw ham pieces to a sorting station, the raw ham pieces comprising silverside pieces, topside pieces and knuckle pieces;

10 sorting a preset number of each type of meat piece into meat bins, each meat bin containing meat pieces from either a right-hand joint or a left-hand joint;

15 delivering the meat bins to a curing station, injecting a preset desirable quantity of brine solution into each meat piece at the curing station;

loading the injected meat pieces into a massaging drum and rotating the drum for a preset period for forming a protein coating on an exterior of each meat piece;

20 discharging the meat pieces from the massaging drum into meat bins;

delivering the meat bins to a cooler, storing the bins in the cooler at a temperature of 3-6°C for a period of 24-48 hours;

removing each bin from the cooler and loading the meat pieces in the massaging drum, rotating the drum for a preset time period;

5 removing meat pieces from the massaging drum and delivering the meat pieces to a trimming station, trimming excess fat and waste material from each meat piece at the trimming station;

delivering the ham pieces from the trimming station to a ham forming station;

10 forming a composite ham at the ham forming station by mounting a silverside piece within an open ended tubular former, laying a topside piece on top of the silverside piece, laying a knuckle piece on the silverside piece overlapping the silverside piece and the topside piece;

15 mounting an elastic net on an exterior of the former extending outwardly at an outlet end of the former, pushing the composite ham out the outlet end, engaging and pulling the netting off the former embracing the ham, closing and tying the ends of the netting;

20 mounting an outer netting on an exterior of the former, pushing the netted ham through the former to pull the outer netting onto the ham;

25 putting the ham into a plastics cooking bag, evacuating air from the cooking bag and sealing the cooking bag under vacuum;

mounting a number of the hams loosely spaced on a cooking rack;

delivering the cooking rack to a cooker, cooking the hams at a temperature of about 80-90°C for a period of 7-8 hours;

5 removing the rack from the cooker and cooling the hams to a temperature of 2-3°C in a chiller;

removing each ham from its associated cooking bag and netting;

10 inserting each ham into a plastics packing bag, evacuating air from the bag and sealing the bag under vacuum.

In one embodiment of the invention prior to packaging, the process includes the further steps of:

15 spraying an exterior of each ham with a honeyed coating composition, mounting a number of said coated hams on a cooking rack, delivering the cooking rack to a cooker, cooking the hams for 4-6 minutes in the cooker at a temperature of 150-170°C, removing the hams from the cooker and cooling the hams.

20 In another embodiment throughout the processing each silverside piece is retained on its associated bone, each composite ham being formed on the bone.

In a further embodiment the process includes the step of injecting about 15% by weight of brine solution into each meat piece.

25 In another embodiment each massaging step is carried out for a period of 20-40 minutes.

In a further embodiment the process includes removing each ham from its associated cooking bag by mounting the bag on a stripping table having a perforated table top rotatably mounted on a support, cutting away the bag from the ham,  
5 draining away juices from the bag through the table top and the support.

The invention will be more clearly understood by the following description of some embodiments thereof, given by way of example only, with reference to the accompanying  
10 drawings, in which:-

Fig. 1 is a flow chart schematically illustrating a ham production process according to the invention;

15 Fig. 2 is a perspective view of meat storage bins used in a ham production process according to the invention;

Fig. 3 is an end elevational view of a brine injection machine used in the process;

Fig. 4 is a perspective view of a massaging device used in the process;

20 Fig. 5 is a detail end elevational view illustrating a doorway and interior of the massaging device;

Fig. 6 is a perspective view of a ham forming station used in the process;

25 Fig. 7 is a partially sectioned, elevational view of the ham forming station showing a number of steps in the formation of a ham according to the process;

Fig. 8 is a plan view of a set of meat pieces arranged to form a ham according to the process;

Fig. 9 is a perspective view of a rack carrying a number of hams for cooking;

5 Fig. 10 is a perspective view of a table used in the process;

Fig. 11 is a sectional elevational view of the table; and

10 Fig. 12 is a perspective view of a cooked ham prepared according to the process of the invention.

Referring to the drawings, a process and apparatus for producing cooked hams according to the invention will be described.

Raw ham pieces 5 are delivered to a sorting station 1. 15 The ham pieces comprise silverside pieces, topside pieces and knuckle pieces. At the sorting station 1, forty of each of the silverside, topside and knuckle pieces are sorted into bins 10 (Fig. 2). The bins 10 comprise rectangular stainless steel containers 11 mounted on wheels 12 and having a handle 13. It will be noted that meat pieces from left-hand side joints and right-hand side joints are collected in different bins 10. Thus, each bin 10 comprises forty sets of either left-hand side or right-hand side silverside pieces, topside pieces and knuckle pieces.

20 25 Each bin 10 is then delivered to a curing station 2. At the curing station 2, each meat piece 5 is delivered through a brine injection machine 18 (Fig. 3). The brine injection machine 18 has an endless conveyor 19 on which

meat pieces are delivered between an inlet 20 and an outlet 21 of the machine 18. As the meat pieces pass through the machine 18, an overhead injector unit 22 reciprocates vertically to engage and inject each meat piece with a charge of brine. The brine charge is preferably about 15% by weight. Injected meat pieces are collected in a bin 10 at an outlet 21 of the machine 18.

Injected meat pieces are loaded in a massaging device 30 (Fig. 4). The massaging device 30 has a rotatable drum 31 with an access door 32 releasably mounted in a door opening 33. Meat pieces 5 are mounted within the drum 31 and the drum 31 is rotated for a period of about 30 minutes tumbling the meat pieces 5 within the drum 31. This tumbling action brings protein in the form of tacky paste to an exterior of each meat piece 5. Meat pieces 5 discharged from the massaging device 30 are returned to bins 10 which are held in a cooler 3 for a period of 24-48 hours at a temperature of approximately 4°C. This holding period advantageously allows the salt from the brine injection to move through the meat so that the brine is evenly dispersed throughout the meat.

Downstream of the cooler 3, each batch of meat pieces is returned to the massaging machine 30 within which they are tumbled for a further period, typically about 30 minutes.

When subsequently removed from the massaging device 30, the meat pieces 5 are delivered to a trimming station 4 (not shown) at which excess fat and waste are trimmed from each meat piece 5.

Downstream of the trimming station 4, the meat pieces 5 are delivered to a ham forming station 40 (Fig. 6). At the ham forming station 40, a table 41 is provided on which the meat pieces 5 are arranged in their respective

types, that is, silverside, topside and knuckle. It is important to the quality of the end product that the meat pieces are all from a corresponding joint, that is either a left-hand or a right-hand joint. Composite hams are 5 then built up on a stainless steel former 43 mounted at a front edge of the table 41. The former 43 has a frusto-conical body 44 having an inlet end 45 and an outlet end 46. A trough 47 extends outwardly of the inlet end 45 forming a lead-in to the inlet end 45.

10 To form a composite ham according to the process, a piece of elastic netting 49 is stretched onto an exterior of the body 44 as shown in Fig. 6. A silverside meat piece 6 is then laid within the body 44 with an outer face of the silverside lying against the interior of the body 44. A 15 topside meat piece 7 is then laid on the silverside meat piece 6 and then a knuckle meat piece 8 is laid on the silverside meat piece 6 overlapping the silverside meat piece 6 and the topside meat piece 7. Finally, a cut-off piece 9 of silverside removed at the trimming station is 20 mounted above the topside and knuckle meat pieces 7, 8. It will be noted that all the meat pieces 5 are laid up with the muscle fibres in alignment. This alignment is important to provide a high quality finished product.

25 Then the netting 49 is partially drawn off the body 44, being drawn down over the outlet end 46. By pushing through the inlet end 45, the ham is pushed into the netting 49 which wraps around the ham as it is pushed out the outlet end 46 of the body 44. Each end 50 of the netting 49 is then drawn closed and tied. The netted ham 30 is then rolled back and forth a few times on the table 41 to ensure the meat pieces 5 closely fit together within the netting 49 the outer protein coating on each meat piece binding the meat pieces together. A second piece of netting 51 is then drawn around an exterior of the body.

44 overhanging the outlet 46 and the netted ham is pushed through from the inlet end 45 to draw the second netting 51 around an exterior of the ham for added support.

5       The ham is then mounted in a plastics cooking bag 52 at a bagging station 53. Air is removed from the bag 52 under vacuum and the bag 52 is then sealed. A number of the bags 52 containing hams are then arranged on a rack 60 (Fig. 9). The rack 60 has a wheeled frame 61 with a number of vertically spaced-apart shelves 62. It will be  
10      noted that the hams are loosely packed on the shelves 62 to allow good air circulation around the hams for cooking.

15      The rack 60 is then delivered into a cooker 54 (not shown) in which the hams are cooked for 7-8 hours at a temperature of approximately 84°C. The temperature at the centre of the ham is typically approximately 70°C.

When removed from the cooker after cooking, the hams are left to cool in air to a temperature of approximately 50°C. The rack 60 is then delivered into a chiller 55 in which the temperature of the hams is reduced to 2-3°C.

20      Upon removal from the chiller, the bags 52 and nets 49, 51 are removed from each ham. To facilitate this, a stripping table 70 (Figs. 10 and 11) is provided. The stripping table 70 has a perforated table top 71 rotatably mounted on a support frame 72. The support frame 72 has a tubular body 73 with a flanged upper end 74 having a raised peripheral rim 75 forming a juice collecting sump beneath the table top 71. The body 73 is mounted on a number of support legs 76. Advantageously, the table top 71 can be rotated for ready access to a ham for stripping off the outer cooking bag and the netting. Conveniently, juices from the bag can run off through the perforated

table top 71 and through the tubular body 73, the excess juices being delivered for waste disposal.

An exterior of each ham is then rolled in breadcrumbs to coat the exterior, the ham then being put in a plastics packing bag. Air is evacuated from the packing bag and the bag is sealed under vacuum. Any suitable labelling can then be applied to an exterior of the bag and a number of the hams can be packaged in boxes or crates and delivered to a chill room awaiting distribution.

Prior to packaging the hams, instead of rolling the hams in breadcrumbs, a honeyed coating may be prepared and sprayed onto an exterior of the hams which are again mounted on racks 60 and delivered to the cooker for flash roasting at approximately 160°C for about 5 minutes. The hams when subsequently cooled can then be packaged as previously described.

It will be noted that where it is desirable to produce a ham on the bone, when dividing the ham originally into the silverside, topside and knuckle pieces, the silverside is left attached to the bone. Processing is carried out in similar fashion to that previously described, however, the end ham product includes the bone.

Advantageously, the ham production process according to the invention facilitates the production of composite hams efficiently to a high standard and of uniform quality. It is important to select the meat pieces for forming each composite ham from either a left or right-hand side joint, and also to lay up the meat pieces in each ham with the muscle fibres in alignment. Thus, advantageously a tender cooked ham product is produced. Further, it is necessary to allow the brine solution to evenly disperse throughout each meat piece otherwise discolouration can occur. The

former facilitates the rapid assembly of each composite ham. Also, the stripping table allows the hams to be readily easily and quickly removed from the cooking bags, advantageously draining away cooking juices.

- 5 The invention is not limited to the embodiments hereinbefore described which may be varied in detail.

CLAIMS

1. A process for producing a cooked composite ham, comprising the steps:

5           delivering raw ham pieces to a sorting station, the raw ham pieces comprising silverside pieces, topside pieces and knuckle pieces;

10           sorting a preset number of each type of meat piece into meat bins, each meat bin containing meat pieces from either a right-hand joint or a left-hand joint;

15           delivering the meat bins to a curing station, injecting a preset desirable quantity of brine solution into each meat piece at the curing station;

20           loading the injected meat pieces into a massaging drum and rotating the drum for a preset period for forming a protein coating on an exterior of each meat piece;

25           discharging the meat pieces from the massaging drum into meat bins;

              delivering the meat bins to a cooler, storing the bins in the cooler at a temperature of 3-6°C for a period of 24-48 hours;

              removing each bin from the cooler and loading the meat pieces in the massaging drum, rotating the drum for a preset time period;

- removing meat pieces from the massaging drum and delivering the meat pieces to a trimming station, trimming excess fat and waste material from each meat piece at the trimming station;
- 5           delivering the ham pieces from the trimming station to a ham forming station;
- 10          forming a composite ham at the ham forming station by mounting a silverside piece within an open ended tubular former, laying a topside piece on top of the silverside piece, laying a knuckle piece on the silverside piece overlapping the silverside piece and the topside piece;
- 15          mounting an elastic net on an exterior of the former extending outwardly at an outlet end of the former, pushing the composite ham out the outlet end, engaging and pulling the netting off the former embracing the ham, closing and tying the ends of the netting;
- 20          mounting an outer netting on an exterior of the former, pushing the netted ham through the former to pull the outer netting onto the ham;
- 25          putting the ham into a plastics cooking bag, evacuating air from the cooking bag and sealing the cooking bag under vacuum;
- mounting a number of the hams loosely spaced on a cooking rack;

delivering the cooking rack to a cooker, cooking the hams at a temperature of about 80-90°C for a period of 7-8 hours;

5 removing the rack from the cooker and cooling the hams to a temperature of 2-3°C in a chiller;

removing each ham from its associated cooking bag and netting;

10 inserting each ham into a plastics packing bag, evacuating air from the bag and sealing the bag under vacuum.

2. A process as claimed in claim 1 wherein prior to packaging, the process includes the further steps of:

15 spraying an exterior of each ham with a honeyed coating composition, mounting a number of said coated hams on a cooking rack, delivering the cooking rack to a cooker, cooking the hams for 4-6 minutes in the cooker at a temperature of 150-170°C, removing the hams from the cooker and cooling the hams.

20 3. A process as claimed in claim 1 or claim 2 wherein throughout the processing each silverside piece is retained on its associated bone, each composite ham being formed on the bone.

25 4. A process as claimed in any preceding claim including the step of injecting about 15% by weight of brine solution into each meat piece.

5. A process as claimed in any preceding claim wherein each massaging step is carried out for a period of 20-40 minutes.
6. A process as claimed in any preceding claim including removing each ham from its associated cooking bag by mounting the bag on a stripping table having a perforated table top rotatably mounted on a support, cutting away the bag from the ham, draining away juices from the bag through the table top and the support.
7. A process for producing a cooked composite ham substantially as hereinbefore described with reference to the accompanying drawings.
8. A cooked composite ham whenever produced by the process as claimed in any preceding claim.

**Patents Act 1977  
Examiner's report to the Comptroller under Section 17  
(The Search report)**

Application number  
**GB 9409236.8**

**Relevant Technical Fields**

- (i) UK Cl (Ed.M) A2B (BMM4; BMM39; BMM9; BMM19;  
BMM29) A2D (DPT)  
(ii) Int Cl (Ed.5) A23L 1/31

Search Examiner  
**K J KENNETT**

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Date of completion of Search  
**21 SEPTEMBER 1994**

(ii) ONLINE DATABASE: WPI

Documents considered relevant following a search in respect of Claims :-  
**1-8**

**Categories of documents**

- |    |   |    |   |
|----|---|----|---|
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| Y: | Document indicating lack of inventive step if combined with one or more other documents of the same category. | E: | Patent document published on or after, but with priority date earlier than, the filing date of the present application. |
| A: | Document indicating technological background and/or state of the art.   | &: | Member of the same patent family; corresponding document.   |

Category	Identity of document and relevant passages		Relevant to claim(s)
A	GB 2059247 A	(MILLER) Example 1B	1
A	US 4948610	(GOGLIO) whole document	1

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